



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : H01R 25/14, H02G 5/04		A1	(11) International Publication Number: WO 94/24731 (43) International Publication Date: 27 October 1994 (27.10.94)
<p>(21) International Application Number: PCT/FI94/00141</p> <p>(22) International Filing Date: 14 April 1994 (14.04.94)</p> <p>(30) Priority Data: 931743 16 April 1993 (16.04.93) FI</p> <p>(71) Applicant (for all designated States except US): NOKIA ALUMINI OY [FI/FI]; Kirkkonummi, FIN-02400 Kirkkonummi (FI).</p> <p>(72) Inventor; and</p> <p>(75) Inventor/Applicant (for US only): NIEMINEN, Eero [FI/FI]; Kolsarintie 1 A 1, FIN-00390 Helsinki (FI).</p> <p>(74) Agent: OY KOLSTER AB; Iso Roobertinkatu 23, P.O. Box 148, FIN-00121 Helsinki (FI).</p>		<p>(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KG, KP, KR, KZ, LK, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>	
<p>(54) Title: A POWER TAKE-OFF ADAPTOR FOR A CONDUCTOR RAIL</p> <p>(57) Abstract</p> <p>A power take-off adaptor for a conductor rail, comprising a box-like frame (1) provided with a group of locking fingers and contact fingers (6, 7) and a switching means (4) which moves the fingers from a disengaged position retracted within the frame to a switching position protruding from the frame as well as locking elements (11, 12) for locking the switching means into the disengaged position and to release the switching means when the adaptor has been inserted into place in the conductor rail. In order to simplify the manufacture and assembly of the adaptor, the locking elements are formed as integral parts of the switching means and the frame.</p>			

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A power take-off adaptor for a conductor rail

The present invention relates to a power take-off adaptor for a conductor rail having a longitudinal switching channel and longitudinal current conductors, whereby the adaptor comprises

- a box-like frame forming a protruding switching member that can be inserted into the switching channel,

- a group of locking fingers and contact fingers positioned in the frame,

- a switching means mounted in the frame movably between a switching position, in which the switching means moves the fingers to a contact position in which the fingers protrude from the switching member, and a locking position, in which the switching means moves the fingers to a disengaged position in which the fingers are retracted within the switching member, and

- a locking means comprising locking elements positioned in the frame and in the switching means, which locking elements lock the switching means stationary in respect of the frame and which are movable in respect of each other by means of the conductor rail to a position unlocking the movement of the switching means when one of the locking elements touches the conductor rail.

Conductor rail systems of this type are today used quite commonly in various rooms to connect lighting equipment, small machines and the like to a power source by means of a power take-off adaptor. Both various adaptors and various conductor rails have been developed and certain adaptor constructions have been presented in Finnish Patent Specifications 47,236 and 84,305, German Offenlegungsschrift 2,810,681 and US Patent Specification 3,960,426.

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In order to ensure that the power take-off adaptor has been placed securely in its correct position in the conductor rail before the contact fingers can be moved to make contact with the current conductors of the conductor rail, various locking constructions have been designed for the adaptors. One locking construction has been disclosed in the above-mentioned Finnish Patent Specification 47,236. It has a latch that is mounted in the switching member of the frame of the adaptor and a retainer part that cooperates with the latch. The latch has a cam which protrudes from the switching member of the adaptor and which is intended to make contact with the bottom of the conductor rail and to push the latch from a locking position to a disengaged position when the adaptor has been pushed into place in the longitudinal channel of the conductor rail. In the locking position the latch prevents both the locking fingers of the adaptor from moving to a protruding position so as to make contact with the conductor rail and the contact fingers from moving to a protruding position to make contact with the current conductors of the conductor rail. Only when the cam has pushed the latch to the disengaged position can both of these actions be carried out.

In this known construction the locking construction calls for two separate movable locking elements and two springs in order to operate in the desired manner. To provide the same kind of locking effect, other kinds of locking constructions have been developed, all of which are comprised of at least one separate movable locking element, such as a lever, bar, catch or the like, and a spring actuating the locking element. The known adaptors therefore have the major drawback that, in the first place, separate components must be manufactured for the locking construction and,

secondly, the components of the locking construction require their own assembly stage. The construction of the adaptor is thus rendered complicated and its assembly becomes more difficult.

5 The object of the present invention is to provide a power take-off adaptor which avoids the above-mentioned drawbacks and is simpler than previous adaptors in terms of its construction and its assembly. This object is achieved by means of a power take-off 10 adaptor according to the invention, which is characterized in that one locking element of the locking means is formed as an integral part of the switching means and the other locking element is formed as an integral part of the frame.

15 The basic idea of the invention is that both locking elements are formed as an integral part of the elements supporting them (the frame or the switching means) and that at least one of the locking elements is formed in such a way that through the action of an external force (the conductor rail) the locking element 20 can move from one position (the locking position) to another position (the disengaged position). This allows the locking element to be manufactured in conjunction with manufacture of the element supporting the locking 25 element, thus obviating the need to manufacture discrete locking components separately. When the adaptor is assembled, a separate stage for assembling the locking means is not required, either.

30 In the following the invention will be described in greater detail with reference to the accompanying drawings, in which

Figure 1 shows a perspective view of a preferred embodiment of a power take-off adaptor according to the invention,

Figures 2 and 3 show a side view and an end view of the adaptor with locking means, the adaptor having been inserted into a conductor rail,

5 Figure 4 shows a perspective view of the switching means of the adaptor,

Figures 5A and 5B show, on a larger scale, a side view of the adaptor's locking means in a disengaged position and, similarly, in a locking position and

10 Figures 6 and 7 are schematic cross-sectional views of two additional embodiments of the locking means of the adaptor according to the invention.

15 The power take-off adaptor shown in Figures 1-3 of the drawings comprises a box-like frame 1 having a switching member 3 that can be inserted into a conductor rail 2 shown in Figure 3, and a first switching shaft 4 that is pivotally mounted with bearings in the frame as well as a second connecting shaft 5 that is mounted with bearings in the frame. The switching shaft is provided with two locking fingers 6 and one contact finger 7, whereas the connecting shaft is provided with 20 two locking fingers 6 and two contact fingers 7. The shafts are connected to each other so as to rotate in sync between a switching position, in which the locking fingers and contact fingers have moved to a position protruding from the switching member, and a locking position, in which the fingers have moved to a disengaged position retracted within the switching member. 25 The switching shaft is for this purpose provided with a crank 8 which protrudes from the frame and can be moved from a disengaged position shown in Figures 1-4 to a switching position shown with broken lines in Figure 2. The contact finger 7 of the connecting shaft can be turned by means of a selector knob 9, which is mounted with bearings to the switching shaft, so that 30 the contact finger extends to the desired side of the 35

frame at any given time depending on the desired phase connection. The construction and operation of the adaptor correspond in principle to the adaptor described in Finnish Patent Specification 84,305 and, therefore, the operation of the adaptor will not be described in greater detail in this connection.

The adaptor is also provided with a locking means 10 in order to lock the switching shaft 4 into said disengaged position. The locking means comprises a flexible opening tab 11 in the frame and a flexible retainer tab 12 in the switching shaft. The opening tab is formed in a part 1a of the frame which, when the adaptor is pushed into the conductor rail, presses against an edge 13a of a longitudinal channel 13 of the conductor rail, as shown in Figure 3.

The opening tab 11 is formed as an integral part of the frame so that the tab extends outside the surface of said part 1a of the frame when the opening tab is not actuated, i.e., when the adaptor has been disengaged from the conductor rail but is pressed in level with this surface when the adaptor is pushed into the conductor rail and said part 1a of the frame is pressed against the edge 13a of the longitudinal channel.

The retainer tab 12 is formed as an integral part of a flange 4a of the switching shaft in such a way that the tab rises into engagement with an abutment 14 in said part 1a of the frame when the retainer tab is not actuated, i.e., when the switching shaft has been moved to the disengaged position by means of the cam 8 in order to connect the adaptor to the conductor rail or to disengage it from the rail. The opening tab and the retainer tab are arranged to lie one above the other in this disengaged position in such a way that

the retainer tab is able to snap in place behind the abutment 14 and to seat under the opening tab.

When the adaptor is inserted into the conductor rail and the edge 13a of its longitudinal channel is positioned against the part 1a of the frame of the adaptor, the opening tab 11 is pressed in level with this part and at the same time presses the retainer tab 12 towards the cam so that the retainer tab is released from engagement with the abutment 14 of the frame, Figure 5B. The switching shaft is thus released from its locked state and can be moved, by turning the crank, to the switching position in which the adaptor is seated firmly in the conductor rail and the contact fingers come into contact with its current conductors 15.

When the adaptor is to be removed from the conductor rail, the switching shaft is turned by the crank back to the locking position such that the adaptor is disengaged from engagement with the conductor rail and can be pulled out of the channel of the conductor rail. In this case, the opening tab 11 is able to flex back to its original position and the retainer tab 12, thanks to its flexibility, snaps into engagement with the abutment 14 of the frame such that the switching shaft becomes unpivotally locked to the frame, Figure 5A.

It is to be noted that no separate parts need be manufactured for the locking means 10, the necessary locking elements being formed during the manufacture of the frame and the switching means. Nor is any special assembly stage required for the locking means, since instead the locking elements assume their correct positions during the assembly of the frame and the switching means.

In the embodiment of the adaptor shown in Figure 6, locking means 20 comprises a flexible locking

5 tab 21, which is formed integrally with the frame and has a retainer cam 22 which engages with a groove 23 in the flange 4a of the switching shaft 4. When the adaptor is inserted into the longitudinal channel of the conductor rail, the channel edge 13a presses the locking tab downwards, whereby the switching shaft is released and can be turned.

10 In the embodiment of the adaptor shown in Figure 7, locking means 30 comprises a flexible retainer tab 31 which is formed in the flange of the switching shaft 4. The retainer tab engages behind the abutment 14 in the part 1a of the frame and extends above the upper surface of said part. When the adaptor is inserted into the longitudinal channel of the conductor rail, 15 the channel edge 13a presses the retainer tab downwards, whereby its bevelled upper edge 31a allows the tab to move under the part 1a of the frame when the switching shaft 4 is turned by means of the crank 8.

20 The Figures and the description relating thereto are intended only to illustrate the idea of the invention. In its details, the adaptor according to the invention can vary within the scope of the claims. The invention can also be applied to adaptors in which the construction for displacing the locking fingers and 25 contact fingers is different from what has been described above and shown in the drawings.

Claims

1. A power take-off adaptor for a conductor rail (2) having a longitudinal switching channel (13) and longitudinal current conductors (15), whereby the adaptor comprises
 - a box-like frame (1) forming a protruding switching member (3) that can be inserted into the switching channel,
 - a group of locking fingers and contact fingers (6, 7) positioned in the frame,
 - a switching means (4) mounted in the frame movably between a switching position, in which the switching means moves the fingers to a contact position in which the fingers protrude from the switching member, and a locking position, in which the switching means moves the fingers to a disengaged position in which the fingers are retracted within the switching member, and
 - a locking means (10; 20; 30), comprising locking elements (11, 12, 14; 21, 22, 23; 31, 14) positioned in the frame and in the switching means, which locking elements lock the switching means stationary in respect of the frame and which are movable in respect of each other by means of the conductor rail to a position unlocking the movement of the switching means when one of the locking elements touches the conductor rail, characterized in that one locking element (12; 23; 31) of the locking means (10; 20; 30) is formed as an integral part of the switching means (4) and the other locking element (14) is formed as an integral part of the frame (1).
2. An adaptor according to claim 1, characterized in that at least one locking element is formed as a flexible tab (11, 12; 21; 31).

3. An adaptor according to claim 2, characterized in that one of the locking elements is a slot (23) formed in the switching means (4) and the other locking element is a flexible tab (21) formed in the frame (1), which tab by means of its flexibility extends into the slot in the switching means and which, when pressed against the conductor rail (2), flexes free from its engagement with the slot.

4. An adaptor according to claim 2, characterized in that one of the locking elements is an abutment (14) formed in the frame (1) and the other locking element is a flexible tab (31) formed in the switching means (4), which tab by means of its flexibility extends into engagement with the abutment of the frame and which, when pressed against the conductor rail (2), flexes free from its engagement with the abutment.

5. An adaptor according to claim 1, characterized in that both locking elements are formed as flexible tabs (11, 12).

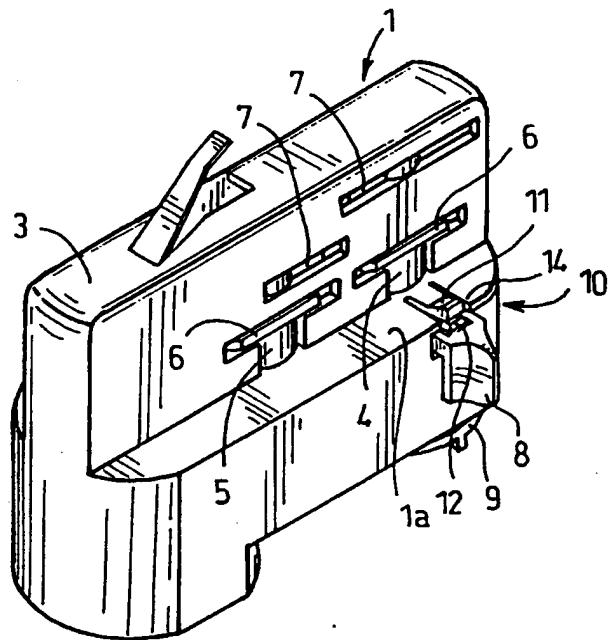
6. An adaptor according to claim 5, characterized in that one locking element is formed as a flexible tab (12) in the switching means (4), which tab engages an abutment (14) formed in the frame (1), and the other locking element is formed as a flexible tab (11) in the frame, which tab, when pressed against the conductor rail (2), releases the first locking element from its engagement with the abutment of the frame.

7. An adaptor according to any one of the preceding claims, characterized in that the locking element (11; 21; 31) is formed at a point (1a; 4a) of the frame (1) or the switching means (4) in which the locking element is pressed against an edge (13a) of the switching channel (13) of the conductor

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rail (2) when the switching member (3) of the frame has been inserted into the switching channel.

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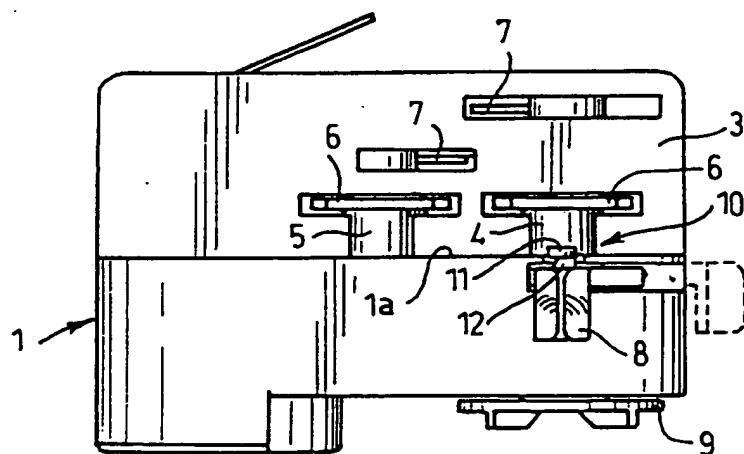


FIG. 2

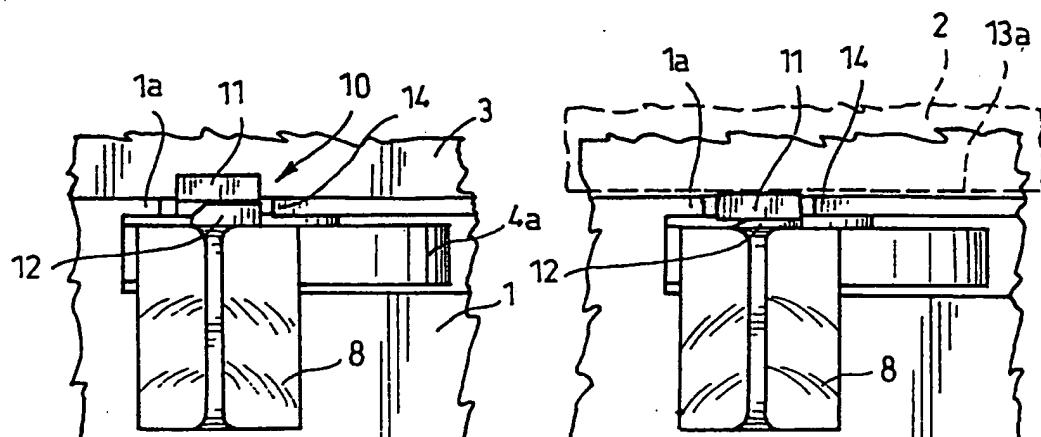


FIG. 5A

FIG. 5B

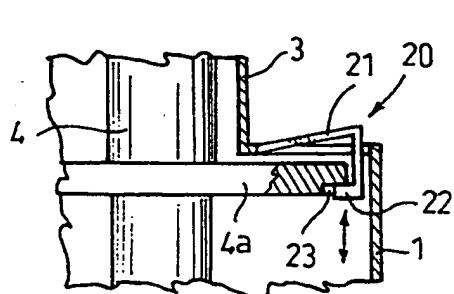


FIG. 6

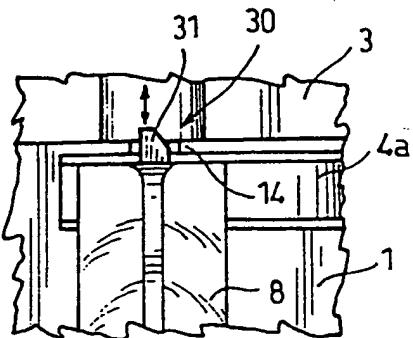


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 94/00141

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: H01R 25/14, H02G 5/04

According to International Patent Classification (IPC) or to both national classification and IPC

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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GB-A- 2140983	05/12/84	BE-A-	899532	16/08/84
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